Medical School Loan Repayment Program

Grant Award Details

Medical School Loan Repayment Program

Grant Type: New Faculty II

Grant Number: RN2-00908-1.2

Investigator:

Name:	Benjamin Yu
Institution:	University of California, San Diego
Type:	PI

Award Value: $28,388

Status: Closed

Grant Application Details

Application Title: Regulation of Adult Stem Cell Proliferation by RAS and Cell-Permeable Proteins

Public Abstract: Our research focuses on developing new tools and models for the next generation of doctors and scientists in all specialties of regenerative medicine. The major obstacles in regenerative medicine are the limited number of pre-existing stem cells and the inability to regulate their proliferation. Our aim is to identify the mechanisms that regulate adult stem cell proliferation. We propose to use this knowledge to produce cell-permeable proteins to reactivate proliferation in these dormant stem cells. These engineered proteins could be used to stimulate regeneration in a variety of organs without the use of genetic vectors. As a model to study adult stem cell quiescence and activation, we study the hair follicle. The hair follicle is an organ that can regenerate itself many times during a lifetime. The mechanisms that regulate the cell cycle of the hair stem cells are likely to function in other adult stem cells. The products of this research will be cell-permeable proteins that mimic the activation of hair stem cells and could be applied to other organ systems to induce regeneration. These tools will be made available to the broader stem cell community to determine the efficacy of engineered cell-permeable proteins in different disease models. So while the immediate practical benefits of this research may to stimulate hair growth to cure hair loss, other medical diseases may benefit as well.

Statement of Benefit to California:	A major goal of regenerative medicine is to replace organs and tissues lost from disease or injury using our own body's cells. Our research focuses on approaches to induce pre-existing stem cells to divide and to develop models of human organ development to study regeneration. This research will greatly benefit the next generation of regenerative doctors and scientists and benefit the California economy now through the development of new tools and jobs. The major obstacles in regenerative medicine are the limited number of pre-existing stem cells and the inability to stimulate their growth for study or for wound repair. Our aims are to identify the mechanisms that regulate stem cell proliferation and that induce stem cell formation, using the hair follicle as a model. The hair follicle regenerated itself more than 10 times during a lifetime and its stem cells are readily accessible. We hope to translate our findings in the hair follicle into developing cell-permeable proteins to induce stem cells in other organs to divide. The products of this research will aid California by helping to speed recovery and to provide therapies for diseases once thought to cause permanent damage. These tools could reduce the suffering and long-term health consequences following organ damage, which should benefit all Californians. This approach should also benefit the health, biotechnology, and pharmaceutical industries of California and provide the next generation of California scientists and doctors with the frontline treatments for diseases in all organ types.
